

edge 14a'''' of a flexible gas-impermeable diaphragm 14'''' and a crimp sealing gasket 55'''''. The diaphragm 14'''' divides the chamber 13'''' into a first chamber 13a'''' that communicates to pressurized fuel entering the integral barbed fitting 22'''' carrying o-ring seal 23'''' and leaving the integral barbed fitting 20'''' carrying o-ring seal 25'''' and a second gas pocket chamber 13b'''' that allows the diaphragm 14'''' to flex in a manner to attenuate fuel pressure pulses exceeding a preselected value in the fuel system to dampen the fuel pressure pulses and smooth operation of the fuel delivery system. The o-rings provide a seal with respective fuel lines or hoses fitted on the fittings 23'''', 20''''. The barbed fittings 22'''', 20'''' are disposed 180 degrees apart on the damper housing 12'''' and arranged in axial alignment on opposite sides of the chamber 13a''''. Superambient (e.g. 15 to 30 psi) gas or air pressure can be trapped in chamber 13b'''' during crimping or a pre-pressurized capsule can be provided in the housing chamber 13b'''' before assembly. For example, a pre-pressurized capsule can comprise a sealed membrane bag with pressurized gas inside.

Figure 7 illustrates still another embodiment of a pulse damper of the invention where like features are represented by like reference numerals quintuple primed. The pulse damper includes a damper body 10'''''' that comprises first and second metallic housings 11''''', 12'''' that mate together to define a chamber (not shown) therein but similar to the chamber 13, 13' etc. in the above embodiments. The first and second housings 11''''', 12'''' are crimped directly together to trap a peripheral edge of a flexible gas-impermeable diaphragm and a crimp sealing gasket as described in the above embodiments. The diaphragm divides the internal chamber into a first chamber that communicates to pressurized fuel entering the integral metal (e.g. steel) pipe fitting 22'''''' and leaving the integral female quick connect fitting 20'''''' of the type described above and a second chamber to allow the diaphragm to flex in a manner described above to attenuate fuel pressure pulses exceeding a preselected value in the fuel system to dampen the fuel

pressure pulses and smooth operation of the fuel delivery system. However, the pressurized fuel can enter the fitting 20'''' and exit the fitting 22'''' . The pipe fitting 22'''' includes a fuel hose or line retention bead 22a'''' and fuel hose or line stop 22b'''' and is adapted to connect to Teflon fuel tubing which includes a stainless steel or fiberglass braiding over it and which is crimped on the fitting 22'''' with the end of the fuel hose or line abutted against stop 22b'''' . The pipe fitting 22'''' and quick connect fitting 20'''' are disposed 90 degrees apart on the damper housing 12'''' . Superambient gas or air pressure can be trapped in the second chamber during crimping or a pre-pressurized capsule can be provided in the housing second chamber before assembly as described above.

Although the invention has been described with respect to certain embodiments thereof, those skilled in the art will understand that the invention is not limited to these embodiments and that modifications and changes can be made thereto without departing from the spirit and scope of the invention as defined in the appended claims.

A version of page 7 and 8 substituted for pending pages 7 and 8 and marked up to show changes follow:

edge 14a'''' of a flexible gas-impermeable diaphragm 14'''' and a crimp sealing gasket 55'''''. The diaphragm 14'''' divides the chamber 13'''' into a first chamber 13a'''' that communicates to pressurized fuel entering the integral barbed fitting 22'''' carrying o-ring seal 23'''' and leaving the integral barbed fitting 20'''' carrying o-ring seal 25'''' and a second gas pocket chamber 13b'''' that allows the diaphragm 14'''' to flex in a manner to attenuate fuel pressure pulses exceeding a preselected value in the fuel system to dampen the fuel pressure pulses and smooth operation of the fuel delivery system. The o-rings provide a seal with respective fuel lines or hoses fitted on the fittings 23'''', 20''''. The barbed fittings 22'''', 20'''' are disposed 180 degrees apart on the damper housing 12'''' and arranged in axial alignment on opposite sides of the chamber 13a''''. Superambient (e.g. 15 to 30 psi) gas or air pressure can be trapped in chamber 13b'''' during crimping or a pre-pressurized capsule can be provided in the housing chamber [13b'''] 13b'''' before assembly. For example, a pre-pressurized capsule can comprise a sealed membrane bag with pressurized gas inside.

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pressure pulses and smooth operation of the fuel delivery system. However, the pressurized fuel can enter the fitting 20'''' and exit the fitting 22'''''. The pipe fitting 22'''' includes a fuel hose or line retention bead 22a'''' and fuel hose or line stop 22b'''' and is adapted to connect to Teflon fuel tubing which includes a stainless [seel] steel or fiberglass braiding over it and [whihc] which is crimped on the fitting 22'''' with the end of the fuel hose or line abutted against stop 22b'''''. The pipe fitting 22'''' and quick connect fitting 20'''' are disposed 90 degrees apart on the damper housing 12'''''. Superambient gas or air pressure can be trapped in the second chamber [13b'''] during crimping or a pre-pressurized capsule can be provided in the housing second chamber [13b'''] before assembly as described above..

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